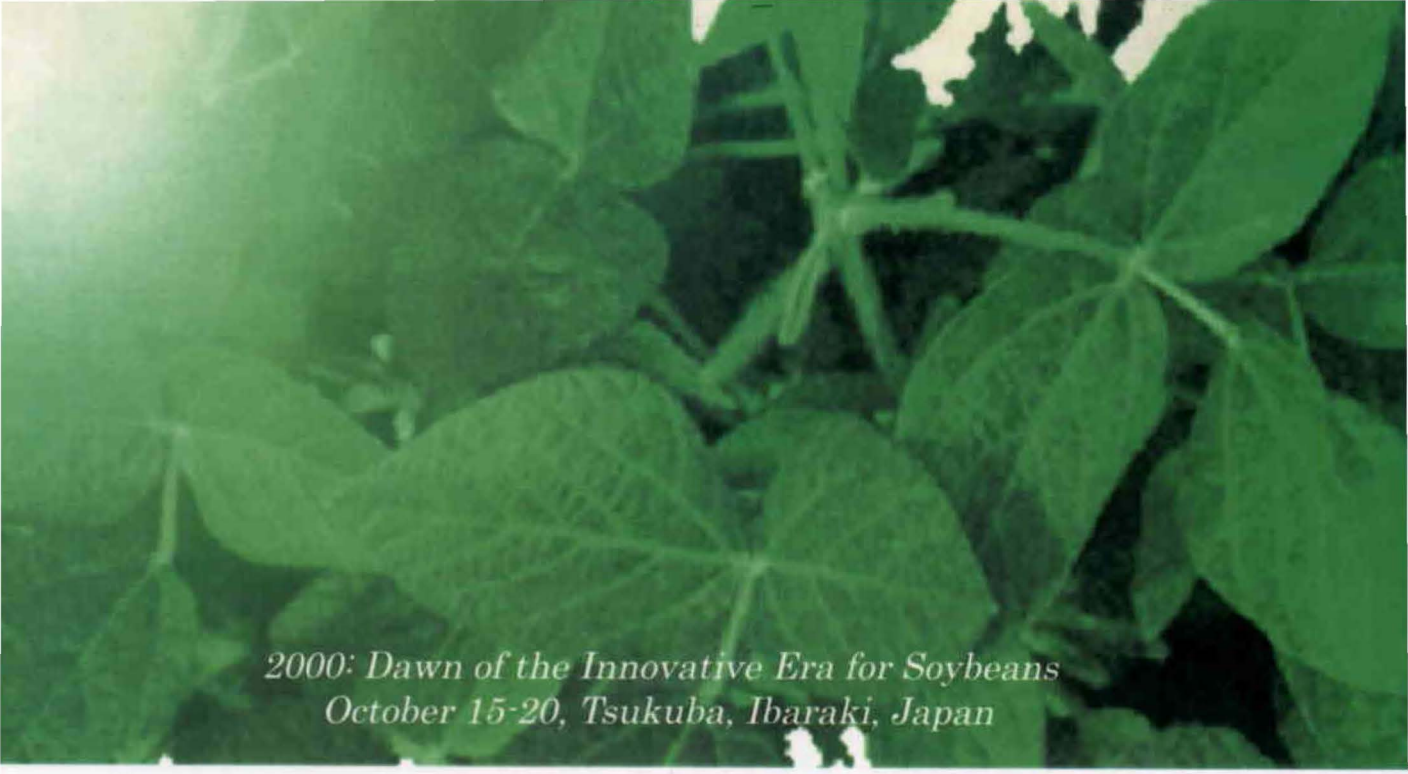

Proceedings

The Third International Soybean Processing and Utilization Conference

The Japanese Society for Food Science and Technology
The Organizing Committee for ISPUC-III

The Third International Soybean

Processing and Utilization Conference (ISPUC-III)

PROCEEDINGS

2000 : Dawn of the Innovative Era for Soybeans

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Foreword

It is our great pleasure to deliver these Proceedings to all of participants at the International Soybean Processing Utilization Conference (ISPUC-III) and persons who are interested in soybeans.

More than 270 invited, contributed and poster papers submitted from 22 countries all over the world are included, reflecting the global potential of soybeans for the 21st Century. The manuscripts are printed as they were prepared by the authors and no editing has been done to minimize editing expenses. The Proceedings are provided as a convenience to participants in attendance at the Conference.

Acknowledgments are due to all sponsorships of many organizations including Japanese Ministries and institutes, international organizations, and especially companies, federations and trade associations from the industrial sector to assist in making this an extraordinary conference.

These Proceedings were compiled and arranged by the Program Committee for ISPUC-III and other session coordinators under the umbrella of the Organizing Committee. We are also highly indebted to all authors who provided their valuable papers and have to apologize to participants for our inability to obtain more papers in a few of the sessions.

The catchphrase of this ISPUC is 2000 : Dawn of the Innovative Era for Soybeans. It is our sincerest wish that these Proceedings will be effectively used during the Conference and serve as a record of the milestone describing the research and technology in this memorial year, 2000.

SAIO Kyoko
Chair of the Program Committee
for the Third International Soybean Processing and Utilization Conference (ISPUC-III)

Program Committee for ISPUC-III

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YANO Hideo

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Oral Presentation

UTILIZATION OF SOYBEAN TEMPE FLOUR ON ADDITIONAL FOOD FOR CHILDREN UNDER FIVE YEARS -OLD: Study of Protein Efficiency Ratio Value

Anna Ingani Widjajaseputra, Susana Ristiarini and Lydia Octavia
Faculty of Agricultural Technology, Widya Mandala Catholic University, Surabaya, Indonesia

ABSTRACT

The utilization of soybean tempe flour on additional food formula for children under five years old provides supplementation to rice as one of common source of calories in Indonesia. The research studied the relationship between protein efficiency ratio (PER) and chemical score of protein on additional food which used soybean tempe flour. PER value determination used 3-4 weeks male Wistar rats during 28 days, using Randomized Completely Block Design. The results indicated that utilization of soybean tempe flour can provide higher PER value than minimal recommended PER value and its nutritive value is depended on its chemical score of protein more than total protein content. This fact is useful for formula food labeling.

Key words: soybean tempe flour, protein quality, PER value

INTRODUCTION

The demand of food with protein adequacy especially for children under five years old increases from time to time in the developing countries. Low purchasing power would be the reason, so all efforts need to be done to provide the food that is more available for them. One of the alternatives for increasing the quality of protein on rice based food is the utilization of soybean tempe – an Indonesian traditional food that is high in protein and digestibility.

The quality of protein can be evaluated by several methods, including Protein Efficiency Ratio (PER), Chemical Score of Protein and Total Protein content, eventhough all nutritive information on food label is based on total protein content due to its practical reason. This research was provided to study the effect of utilization of soybean tempe flour on protein efficiency ratio (PER) value of the treated diets.

The results indicated that utilization of soybean tempe flour can provide PER value which is higher than minimal recommended PER value (2.10) and the nutritive value of the additional food is depended on its chemical score of protein more than total protein content. This fact is useful for food labeling especially for infant food formula.

MATERIAL AND METHODS

Preparation of food formula

The food is composed of soybean tempe flour, rice-roasted flour, skim milk, coconut oil and sugar.

Soybean tempe flour

The tempe is made from 24 hours fermented soybean by using *laru* (indigeneous mixed culture). The making process of the flour is as follows: cutting the tempe on size 1x0.5x0.5 cm^3, steam blanching at 80°C for 10 minutes, oven drying at 50-55°C to reach moisture of 10%, grinding and sieving at 50 mesh.

Rice-roasted flour

The flour is made as follows: cooking the rice at 100°C for 15 minutes, steaming (80°C, 30 minutes), drying at 50-55°C to reach moisture of 10%, roasting at 100°C for 5 minutes, grinding and sieving at 50 mesh.

The research used three levels of chemical score, respectively 60,65, and 70. Amount of calories of treated diets was around 370 calories. The scores were based on weight of food formula components, protein, fat, and carbohydrate

(Direktorat Departemen Kesehatan RI, 1979) and its essential amino acid proportion (Poerwosoedarmo and Sediaoetama, 1997).

Research Design

The formula were treated on 3-4 weeks - old male Wistar rats for 28 days, by using Randomized Completely Block Design, with 5 replications. The rats were kept in individual cages (30°C, 80-90% relative humidity and lights all day) and tap water *ad libitum*. Protein contents of each formula was measured to determine the amount of protein consumed by the rats, using Micro-Kjeldahl methode (AOAC, 1984). The calculation of chemical score of protein presented in Pomeranz (1991). PER was calculated as the ratio of weight gain and the amount of protein intake (AOAC, 1990).

RESULTS AND DISCUSSION

The results indicated that PER value is depended on its chemical score of protein more than its total protein content (Table 1). There is a slightly difference in PER value between chemical score of 60 and 65. On the other hand, the protein content data of various type of diets with chemical score of 60 and 65 does not give significant difference. Treatment of chemical score of 70 shows significant difference on both PER value and total protein content.

Table 1. Chemical Score, Protein Efficiency Ratio, Total Protein Content and Calorie Value of The Diets

Chemical Score of Protein	Protein Efficiency Ratio	Total Protein Content (%)	Calorie
60	2.21[a]	20.29[a]	369.32
65	2.38[a,b]	20.04[a]	370.88
70	2.58[b]	17.78[b]	370.60

The notation PER data based on Least Significant Difference (LSD)

This different response between PER value and total protein content on the three levels of chemical score of protein (60, 65 and 70) due to the difference of its protein quality. As we know that protein quality is depended on variety and amount of the essential amino acids.

The role of soybean tempe flour on additional food diets is as a supplement to rice which has lysine deficiency as showed on Table 2.

Table 2. The Composition of Essential Amino Acids (g/100g of edible portion)

Variety of food	Trp	Thr	Ile	Leu	Met+Cys	Phe	Val	Lys
Soybean tempe flour	0.67	1.97	2.11	3.26	0.58	2.50	2.45	2.93
Rice-roasted flour	0.08	0.29	0.35	0.65	0.24	0.38	0.52	0.30
Skim milk	0.50	1.64	2.27	3.49	1.19	0.12	0.14	2.77

Source: Poerwosoedarmo and Sediaoetama, 1997.

CONCLUSION

The results indicated that utilization of soybean tempe flour can provide PER value which is higher than minimal recommended PER value (2.10) and the nutritive value of the additional food is depended on its chemical score of protein more than total protein content. This fact is useful for food labeling especially for infant food formula.

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